

EXHIBIT B

Battery surge: The technology is here, but 'demand rates' might be key to promoting them



Ryan Randazzo, The Republic | azcentral.com

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(Photo: koinseb/Getty Images/iStockphoto)

While some rooftop-solar energy advocates have opposed "demand rates" from Arizona utilities, other companies see the rates as an opportunity to launch a new market for household-battery and solar systems that benefit customers and the power grid.

The demand charges, which base monthly rates on a customer's highest hour or half-hour of use, are luring companies that sell systems allowing solar customers to store excess power for their own use in batteries that are about the size of a rifle cabinet. Tabuchi Electric of Japan and JLM Energy of California say the technology can help users lower the demand rates, as well as reduce strain on the grid.

Salt River Project began billing solar customers through demand rates more than a year ago, and Arizona Public Service Co. has applied to regulators for approval to do the same for most residential customers.

The utilities contend that customers with rooftop solar panels are subsidized by non-solar customers because under the net-metering system of billing, they receive retail credits for the surplus electricity they return to the grid. Also, they say, demand rates more accurately reflect the strain a particular home puts on the power grid.

That's because solar panels produce the most power at noon, but generate only about a quarter of their full capacity toward sunset and nothing after dark. Meanwhile, demand for electricity in the Phoenix area peaks around sunset, when businesses and homes are running air-conditioners the most. Despite the power rooftop solar panels generate when the sun is high, they don't do much to mitigate the late-afternoon demand.

Batteries can change that. Rather than send excess power to the grid, the solar panels can fill up the batteries during the day and can be used to power appliances during the evening peak.

RELATED: [How we got here: Arizona's rooftop-solar industry \(/story/money/business/energy/2016/05/02/arizona-solar-industry-timeline/83715464/\)](/story/money/business/energy/2016/05/02/arizona-solar-industry-timeline/83715464/)

"We think a demand charge is the best chance for us to use our strength for customers," said Harumi McClure, general manager of Tabuchi Electric, which launched North American operations last year in San Jose, and has installed its products on two Arizona homes, one each in SRP and APS territory.

"Originally we were approaching California, Hawaii and Canada, then we saw the market in Arizona and what utilities are doing with a demand charge," McClure said.

Demand rates get attention

McClure said the rates would provide an incentive for batteries that would make the power grid more efficient.

She visited Phoenix last week to attend a conference on demand charges. Outside that conference, employees of SolarCity, a rooftop-solar company, and members of the Sierra Club and other groups protested the APS proposal. They say demand rates will kill off the traditional solar market that doesn't rely on batteries, and point to the decline of solar in SRP territory as evidence.

McClure said that utilities in Japan, like in Arizona, were hesitant to allow too much rooftop solar onto the grid. But there was a large push to increase renewable-energy use in that country following the 2011 Fukushima Dai-ichi nuclear disaster. They faced the same mismatch between solar production and demand on the grid, but batteries eased the utility's concern, she said.

"Two solutions were important in Japan: storage and balancing capabilities to have the utility control the export to the grid," she said.



- **The latest:** [Cease-fire in solar war \(http://www.azcentral.com/stc/initiatives-dropped-solar-cease-fire/83667026/\)](http://www.azcentral.com/stc/initiatives-dropped-solar-cease-fire/83667026/)
- **Timeline:** [A look at Arizona's rooftop-solar industry \(http://www.azcentral.com/stc/solar-industry-](http://www.azcentral.com/stc/solar-industry-)

In Arizona, batteries can be used to keep demand below a certain threshold rather than send power to the grid, she said. That would limit, but not eliminate, the demand charge each month.

The demand rates certainly have reduced the market for solar only. As of June 3, SRP had received 476 applications, and 348 of those have been installed, since the new demand rates went into effect. Prior to the demand rates the company had 600 or more solar applications a month. Many of the solar installations SRP is seeing now use a demand manager that limits the number of large appliances that run at once during peak hours.

Battery installers line up

Other companies are staking out Arizona because of the demand rates both in place and being proposed.

JLM Energy, which has 10 employees in Phoenix selling solar arrays backed up by batteries, says it opened its Arizona office in response to SRP's solar demand rates.

"A lot of people have been told you can't go solar (in SRP territory), it won't work for you," said Farid Dibachi, founder and CEO of JLM. "There is a lot of misinformation distributed by — I hate to say it, but by my colleagues and competitors."

Dibachi said that by combining solar with batteries and a monitoring system that prevents multiple large appliances from operating at once, customers can avoid high bills from demand charges.

JLM got its start in a town outside Sacramento, producing battery systems for properties off the power grid. But neither Dibachi nor McClure suggest using batteries to go off the grid in urban areas. They propose using solar and batteries to reduce monthly bills while remaining connected to the power grid.



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APS, SolarCity fail to reach agreement over net metering

(http://www.azcentral.com/story/money/business/energy/2016/06/09/aps-solarcity-fail-reach-agreement-over-net-metering/85668380/)

JLM pairs solar panels with batteries that hold 10 kilowatt-hours of electricity and a device that monitors major appliances and sends them phone alerts warning, for example, that running a load of laundry during peak hours will trigger a high demand for the month.

The average residential system with all three components retails for \$25,000, Dibachi said.

"It is a very aggressive pricing strategy," he said.

Other companies targeting the SRP demand rates include Sun Valley Solar Solutions, American Solar and Roofing and Harmon Electric. Those solar companies also all are participating in a battery storage project with APS involving 75 homes. JLM is providing the energy-management systems for all of the pilot project properties and batteries for some.

RELATED: Solar customers learn to live with demand rates (/story/money/business/energy/2016/03/25/srp-data-shows-some-solar-customers-save-money-demand-rates/81886548/)

Opposition to demand rates remains

SolarCity Corp., the largest solar installer in the state and country, has tested batteries with solar in California but has been among the most vocal critic of demand rates. The company is suing SRP over its solar rates and many SolarCity employees participated in the protest of the APS proposal last week.

The company said it can't disclose how soon batteries might be available in Arizona, citing Securities and Exchange Commission rules.

Timeline/83715484/

- Legislators deploy 2 rooftop solar countermeasures (http://www.azcentral.com/stc/ms-awareness-morphed-into-rooftop-solar-fight/83616456/)
- Solar ballot initiative launched by super PAC (http://www.azcentral.com/stc/solar-energy-ballot-initiative/83088390/)
- Rural utility's case could have big impact on rooftop solar fees (http://www.azcentral.com/stc/utilitys-case-could-have-big-impact-rooftop-solar-fees/80516092/)

SolarCity Communications Director Will Craven said the company would prefer to offer such advances on its own terms, not a utility's.

"Our battery storage business is driven by public demand for what's considered the next big consumer energy product, not by utility actions," he said. "Also, the battery product will not be able to mitigate against the economic impact of demand charges."

Dibachi said SolarCity has been slow to adapt to new utility rates, which he said are only logical because of the mismatch between when solar panels make the most power and when utilities need the most power.

"They have been very spoiled and act like a spoiled brat," he said of SolarCity. "Why should they use APS' grid and not pay for that?"

Dibachi said it's only a matter of time before other states introduce time-of-use rates and demand rates to encourage solar technologies to better align their output with demand on the grid.

"The rest of the country is going this way," he said. "They have to."

'The solar-only story is a dinosaur'

Officials from APS and SRP said they hope to encourage battery technology in their territories because it would be a much greater benefit to managing peak loads than solar alone.

"That is where we expect to be in the future," said Marc Romito, APS renewable-energy program manager. "This will not be a solar-only story. The solar-only story is a dinosaur. Solar-only has caused problems, and everyone wants to know when the batteries are going to come and when we are going to have other cool technologies."

APS is nearly finished selecting the 75 homes that will participate in its \$4 million solar and battery-storage pilot project. Battery systems will be tested against homes that also have solar and demand controlling devices, smart inverters and advanced air-conditioners, Romito said.

The equipment should be installed by August, when the lithium-ion phosphate batteries JLM plans to use for the project will have regulatory approval for use in homes, he said.

APS will have control of all the equipment for testing purposes, and will compare how well batteries work with solar versus simply cooling a home substantially before peak afternoon power rates kick in, then using the air-conditioning minimally until after peak hours. Peak hours for APS rates are from noon to 7 p.m. in summer, though the company proposes changing them to 3 p.m. to 8 p.m.

Time-of-use rates that charge higher rates during peak hours already are available from APS and SRP, but Romito said they are not enough incentive for customers to use advanced technologies.

"The demand-rate structure will turn on a go light for all the cool technology customers have been waiting to use," he said.

SRP has a pilot study involving batteries in a partnership with Arizona State University, where the utility is trying to determine if battery systems can effectively navigate the demand rate required for solar customers, said Lori Singleton.

"It does look promising," she said.

SRP also is testing advanced inverters the utility can control to help improve power quality on the grid from rooftop solar.

"We are interested in demand controllers and interested in seeing how they work," she said. "We hear from the vendors they are working well so we are interested in learning more about that technology."

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A BRIEF HISTORY OF ARIZONA'S SOLAR INDUSTRY

The recent history of rooftop solar panels in Arizona has been marked by rapid growth and falling prices for solar. It also has been turbulent as the industry spurred many electricians and roofers to jump into the industry, and tens of thousands of homeowners and businesses to take advantage of generous subsidies and install the panels. As the industry grew, it gained clout, and the negotiations with state regulators on how to bill solar customers grew raucous. Many renewable-energy advocates want the subsidies, particularly net metering, to continue. Utilities contend that those subsidies were a nonissue when only a few thousand customers used solar, but that as tens of thousands of people install panels, they are overly generous and unfair to customers who don't have solar.

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